Traffic Impact Study

St. Croix Meadows Racing Park
Proposed Casino
Hudson, Wisconsin

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INTRODUCTION

BRW, Inc. has completed a traffic impact study for a proposed casino development located in Hudson, Wisconsin. The proposed development includes remodeling a portion of the existing St. Croix Meadows Greyhound Racing Park grandstand building to accommodate casino gaming. The St. Croix Meadows Greyhound Racing Park site is located south of Interstate Highway 94 (I-94) on Carmichael Road (County Trunk Highway [CTH] F - see **Figure 1**). The purpose of this impact study was to investigate traffic issues associated with the proposed casino development. The primary components of this traffic study include:

- Existing Conditions – Documentation and analysis of existing traffic volumes, lane geometry and traffic control near the site
- Trip Generation and Distribution – Estimation of the number of vehicle trips generated based on the proposed size of casino development and orientation of those trips to the regional road system
- Capacity Analyses of "No-Build" Scenarios – Estimation of Level of Service (LOS) for key intersections and ramp areas on I-94 assuming that the casino was not constructed
- Capacity Analyses of Casino Development Scenarios – Includes LOS calculations for key intersections and ramp areas on I-94 assuming that the proposed casino is constructed

A summary of the traffic analyses that were performed is included in the following paragraphs:

EXISTING CONDITIONS

The proposed casino site is located south of I-94 on Carmichael Road (CTH F) in the City of Hudson, Wisconsin (see **Figure 1**). I-94 is an east-west multi-lane interstate highway with approximately 36,000 to 47,000 vehicles per day, or average daily traffic (ADT), near the Carmichael Road interchange. Carmichael Road is a six lane divided roadway between I-94 and Center Drive and a four lane divided roadway between Center Drive and the proposed casino site. Since much of the traffic on Carmichael Road is accessing commercial development near I-94, the ADT varies significantly from north to south. Traffic counts completed in 1997 indicated that the ADT on Carmichael Road between I-94 and Crest View Drive was 30,000 and 8,200 south of Crest View Drive. BRW, Inc. completed ADT counts in November 1999 and recorded an ADT of 10,000 south of Center Drive on Carmichael Road.

The existing greyhound racing facility attracts a majority of its patrons from the Minneapolis / St. Paul metropolitan area. It is expected that the proposed casino would likely attract persons from the same area, indicating that most patrons would utilize I-94 and Carmichael Road to access the site. Therefore, the key intersections selected for traffic analysis are located along Carmichael Road between I-94 and the proposed site. The intersections studied were:

- Carmichael Road / Westbound I-94 Ramps
- Carmichael Road / Eastbound I-94 Ramps
- Carmichael Road / Crest View Drive (Stage Line Drive)
- Carmichael Road / Center Drive

All of these intersections currently are controlled by traffic signals. In addition to these four intersections, the ramp merge / diverge conditions on I-94 at the Carmichael Road interchange were studied. Through the Carmichael Road interchange, I-94 contains three through lanes in each direction. Three of the ramp terminals have one lane merging / diverging, with the exception of the eastbound exit to Carmichael Road which has two diverging lanes instead of only one. There is also an auxiliary lane on eastbound I-94 between the previous exit (northbound Highway 35) and the Carmichael Road exit.

For purposes of analysis, it was necessary to determine traffic volumes, roadway geometry and traffic control at each of the identified key intersections and I-94 ramp areas. BRW, Inc. collected hourly traffic volumes at each of the four key intersections on Carmichael Road on November 5 and 6, 1999. The purpose of collecting on two dates was to determine peak hour traffic volumes on a weekday (Friday) and on Saturday. Friday evening and Saturday afternoon are traditionally the busiest periods for highway traffic and data were collected for several hours to isolate the peak one hour of traffic. It was assumed that the peak hour of traffic generation for the casino would coincide with the peak hour for adjacent roadway traffic. Roadway geometry and traffic control were also documented by BRW, Inc. at the same time the volumes were collected.

The peak hour turning movements are presented in **Table 1**. The peak hour is defined as the highest continuous 60 minutes of traffic at any particular intersection. Specific peak times were noted for each of the four signalized intersections, however a common peak time among all intersections was chosen to maintain consistent traffic volumes along Carmichael Road. The weekday peak hour was determined to occur between 5:00 p.m. and 6:00 p.m., while the Saturday peak hour was between 12:00 p.m. and 1:00 p.m.

The peak hour volumes on for the I-94 ramp areas were developed from peak hour percentages and other traffic data received from the Wisconsin Department of Transportation (WisDOT). No distinction is made between weekday and Saturday volumes for the I-94 ramp analysis, since the values are based on average daily traffic.

It should be noted that a major racing event at the existing St. Croix Meadows Greyhound Park was occurring simultaneously to the traffic data collection on November 6, 1999. Therefore, it was assumed that traffic generated by the existing racetrack would be included in traffic counts collected by BRW, Inc.

The existing roadway geometry and traffic control are located in **Figure 2**. All existing traffic signals in the studied area are linked to traffic responsive loops, located under the pavement. This allows for the traffic signals to adjust to variations in traffic, which lowers delay and improves overall traffic flow.

TRIP GENERATION

The Institute of Transportation Engineers (ITE) periodically publishes trip generation rates for various types of development, which represent data from actual traffic observations completed after developments were operating. However, only limited information is available from ITE pertaining to casino trip generation. Therefore, rather than simply assume that trip generation rates provided by ITE are valid, data were collected from regional casinos to develop a range of anticipated trip generation. The regional casinos used for trip generation data were Grand Casino Mille Lacs (near Onamia, Minnesota), Mystic Lake Casino (in Prior Lake, Minnesota) and Potawatomi Bingo Casino (in Milwaukee, Wisconsin).

The data that were collected from regional casinos are based on peak hour observations only, neglecting daily trip generation. To estimate daily trip generation, data for entering and exiting casino-generated vehicles at Grand Casino Mille Lacs between 9:00 a.m. and 9:00 p.m. were obtained, and are presented in **Table 2**. Minnesota Department of Transportation (Mn/DOT) ADT counts were obtained from an automated traffic recorder station south of the Grand Casino Mille Lacs on Trunk Highway (TH) 169, which provided information between the hours of 9:00 p.m. and 9:00 a.m. It was assumed that the proposed casino in Hudson would operate 24-hours and trip generation characteristics throughout the day would be, in general, similar to those on TH 169 near Grand Casino Mille Lacs. This analysis indicated that peak hour trip generation would account for approximately 8.6% of the total daily trip generation.

For most traffic generators, the number of vehicles generated is a function of the development size, most commonly in terms of square feet or other pertinent feature. Based on data from regional casinos, criteria of size were developed in terms of square feet (S.F), gaming positions and slot machines. The proposed Hudson Casino is planned to be 50,000 S.F., with 1,620 gaming positions, including 1,500 slot machines. **Tables 3, 4** and **5** contain the range of trip generation values based on rates from regional casinos.

A summary of the range of trip generation values obtained is located in **Table 6**. The range of trip generation estimates represents the lowest anticipated generation values and highest anticipated generation values. The total estimated daily generated vehicles ranges between 2,497 trips per day (based on 50,000 S.F. using Mystic Lake Casino generation) and 10,814 trips per day (based on 1,500 slot machines using Mystic Lake Casino generation).

To provide the most conservative analysis possible, the highest estimated generation rate was used for traffic capacity analyses. Since the highest calculated generation rate was used, the actual number of trips generated by the proposed casino would likely be less than 10,814 trips per day. However, it was assumed that if the highest estimated amount of traffic can be accommodated by the existing roadway system, then the actual amount of traffic experienced could be accommodated as well.

Based on the above criteria, the peak hour capacity analyses were based on a casino generation rate of 885 vehicle trips per hour for the weekday peak hour and 975 vehicle trips per hour for the Saturday peak hour. These analyses assumed that the peak hour of casino generated traffic would occur during the peak hour of adjacent roadway traffic. Based on information from Grand Casino Mille Lacs, the weekday peak hour of casino generation is 4:00 p.m. to 5:00 p.m., while the observed weekday peak hour of traffic on Carmichael Road was 5:00 p.m. to 6:00 p.m. For the Saturday peak hour, information from Potawatomi Bingo Casino indicated that the Saturday peak hour was 4:30 p.m. to 5:30 p.m., while the observed Saturday peak hour of traffic on Carmichael Road was 12:00 p.m. to 1:00 p.m. Therefore, the assumption that the peak hour of casino generated traffic and adjacent roadway traffic occur simultaneously results in peak hour volumes that likely over estimate actual traffic volumes.

TRIP DISTRIBUTION

St. Croix Meadows Greyhound Racing Park provided BRW, Inc. with a list of addresses of racetrack patrons who have been issued "Player's Premium" cards. It was assumed that the proposed casino would attract persons from similar areas as the existing racetrack and that "Player's Premium" cardholders were representative of all likely casino visitors. Likely routes between cities on the "Player's Premium" list and the Hudson site were developed using principal routes, where applicable. The trip distribution values used in this analysis for casino generated traffic is shown in **Figure 3**.

As shown in **Figure 3**, a large portion (81%) of total vehicle trips would likely utilize I-94 from the Minneapolis / St. Paul metropolitan area to access the Hudson site. Other area roadways account for the remaining 19% of vehicles generated. It is estimated that approximately 93% of the total site generated traffic would utilize Carmichael Road between I-94 and the proposed site.

A second component of trip distribution is the peak hour split between inbound and outbound traffic. Based on data obtained from Grand Casino Mille Lacs, Mystic Lake Casino, Potawatomi Bingo Casino and ITE Trip Generation, 6th Edition rates, the estimated peak hour inbound / outbound split is 49% / 51%, respectively. This split was found to be identical for weekday and Saturday peak hour traffic. A complete list of the various in and out rates used is located in **Table 7**.

CAPACITY ANALYSES – EXISTING CONDITIONS

The capacity of a roadway segment or individual intersection is usually classified by a qualitative measure called level-of-service (LOS). Much like an academic report card, LOS values are listed by letter grade such that LOS A conditions represent high quality operations with little delay and no congestion. Conversely, LOS F represents conditions with extreme delay and severe congestion. For most urban areas, LOS D is considered to be the lowest acceptable level of operation, although some rural areas use LOS C. Since Hudson is a growing city within a rapidly expanding county, LOS D was considered the lowest acceptable level of operation for this analysis.

During the peak hour for weekday and Saturday conditions, the four studied intersections on Carmichael Road operate at LOS B, except for Carmichael Road / Center Drive which operates at LOS A.

For the ramp areas on I-94, the merge / diverge areas west of Carmichael Road were found to operate at LOS A, while the merge / diverge areas east of Carmichael Road were found to operate at LOS B. All LOS values for every scenario are listed in **Tables 12A** and **12B** (for the weekday and Saturday peak hours, respectively).

CAPACITY ANALYSIS – FUTURE CONDITIONS

For the future conditions, three specific years were analyzed for weekday and Saturday peak hour conditions. The years chosen for analysis were 2001, 2010 and 2020. For each year, two scenarios were analyzed; a "No-Build" scenario in which the casino would not be constructed and development scenario assuming a casino was developed at the proposed site. The purpose for completing a No-Build scenario for each analyzed year was to determine impacts to the roadway system that would likely be caused by casino generated traffic.

To determine background traffic growth, data were gathered from WisDOT ADT forecasts for the studied area. Accounting for increase of background traffic attempts to predict traffic levels that would exist regardless of the proposed casino. For this area, an industrial park is planned to the east of Carmichael Road near I-94; however, other background traffic increases could be due to new commercial or residential development in the area. **Table 8** represents estimated ADT values developed by WisDOT, indicating in general that traffic will likely increase at a rate of 2.1% per year. Other WisDOT ADT forecasts for the year 2020 are comparable with the values listed in Table 8. This background traffic growth rate was applied to the existing traffic levels to obtain 2001, 2010 and 2020 No-Build volumes.

Forecast Year 2001 Conditions

Tables 9A and **9B** contain the forecast turning movements for the 2001 No-Build and casino development scenarios, respectively.

For the 2001 No-Build and casino development scenarios for weekday and Saturday peak hours, the LOS at each studied intersection or ramp area is forecast to be identical to the existing conditions for almost all cases. The only exception is the westbound ramp merge area on I-94 at Carmichael Road, which is forecast to change from LOS A for the No-Build scenario to LOS B for the casino development scenario for both weekday and Saturday peak hours.

At the four studied intersections along Carmichael Road, the estimated capacity of each intersection being utilized was calculated and is presented in **Figures 4A** and **4B** in terms of percentage of intersection capacity. Figure 4A represents the typical weekday conditions forecast for 2001 based on the No-Build and casino development scenarios. The reserve capacity, or available capacity that is not used, represents the difference between the theoretical capacity of the intersection (100%) and the actual percentage of capacity used. For example, the intersection of Carmichael Road and Crest View Drive is the intersection with the least reserve capacity (100% minus the 74% utilized yields 26% reserve capacity).

In all 2001 conditions, the intersection of Carmichael Road and Crest View Drive represents the most congested intersection with the least reserve capacity. However, it is important to note that regardless of whether or not the casino is constructed, the existing roadway system can accommodate the forecast traffic volumes for 2001.

Forecast Year 2010 Conditions

Tables 10A and **10B** contain the forecast turning movements for the 2010 No-Build and casino development scenarios, respectively.

For the 2010 weekday peak hour conditions, all studied intersections are forecast to operate at the same LOS letter grade as the 2001 (and existing) conditions. The westbound entrance ramp to I-94 is forecast to operate at LOS B for the No-Build and casino development scenarios, while the eastbound exit ramp to Carmichael Road is forecast to continue to operate at LOS A. On the east side of Carmichael Road, the eastbound entrance ramp merge area is forecast to operate at LOS C for the No-Build and casino development scenarios, while the westbound exit ramp would likely continue to operate at LOS B.

For the 2010 Saturday peak hour conditions, the intersections of Carmichael Road with the westbound I-94 ramps and Crest View Drive are forecast to operate at LOS C under the casino development scenario. These intersections would likely operate at LOS B under the No-Build scenario.

Forecast Year 2020 Conditions

Tables 11A and **11B** contain the forecast turning movements for the 2020 No-Build and casino development scenarios, respectively.

For the 2020 weekday peak hour conditions, the intersections of Carmichael Road with the eastbound I-94 ramps and Center Drive are forecast to operate at the same LOS as previous scenarios. The westbound I-94 ramp intersection with Carmichael Road is forecast to operate at LOS B under the No-Build scenario and LOS C under the casino development scenario. The intersection with Crest View Drive is forecast to operate at LOS C under the No-Build scenario and LOS D under the casino development scenario during the weekday peak hour.

During the Saturday peak hour, all studied intersections are forecast to operate at the same LOS between the No-Build and casino development scenarios, except for the intersection of Carmichael Road / Westbound I-94 Ramp. This intersection is forecast to operate at LOS C during the peak hour for the No-Build scenario and LOS D for the casino development scenario.

The eastbound exit ramp at Carmichael Road is forecast to continue to operate at LOS A under the No-Build and casino development scenarios, while the westbound entrance ramp is expected to operate at LOS B for the No-Build scenario and LOS C for the casino development scenario. East of Carmichael Road, all ramp operations on I-94 are expected to operate at LOS C under both scenarios.

CONCLUSIONS

- The proposed Hudson, Wisconsin casino site would likely generate between 2,500 and 10,800 vehicle trips per day. Since no reliable published trip generation values are available, this range of generation is based on observations from other casino establishments in Wisconsin and Minnesota.
- To provide the most conservative analysis, the highest estimated vehicle generation values were used for this traffic analysis, as well as assuming that the peak hour of casino traffic generation and the peak hour of adjacent roadway traffic occurred simultaneously.
- For the intersections studied on Carmichael Road, as well as the ramp merge and diverge areas on I-94, the existing conditions are generally characterized by high quality traffic operations (LOS A and B).
- For 2001, one year after the proposed casino would open, the casino generated traffic appears to have little impact to the overall traffic operations of the area. All intersections and ramps are forecast to operate at LOS A or B under the No-Build scenario and are forecast to continue operating at LOS A or B with the casino development in place.
- For the 2010 No-Build scenario, one ramp (Eastbound I-94 Entrance Ramp at Carmichael Road) is forecast to operate at LOS C, while all other intersections and ramps are forecast to operate at LOS A or B. The only changes to traffic operations caused by the addition of the casino development occur for the Saturday peak hour at the Carmichael Road / Westbound I-94 Ramp intersection and the Carmichael Road / Crest View Drive intersection, where the LOS changes from LOS B to LOS C.
- By 2020, for the No-Build scenario, one of the key intersections (Carmichael Road / Crest View Drive) is forecast to experience LOS D operation during peak hours on weekdays and Saturday. All other studied intersections and ramps are expected to operate at LOS C or better. The casino development scenario affects traffic operations at three locations:
    - Carmichael Road / Westbound I-94 Ramp – for weekday peak hour, LOS changes from LOS B to C, and for Saturday peak hour, LOS changes from LOS C to LOS D.
    - Carmichael Road / Crest View Drive – for weekday peak hour, LOS changes from LOS C to LOS D.
    - Westbound I-94 Entrance Ramp at Carmichael Road – for weekday peak hour and Saturday peak hour, LOS changes from LOS B to LOS C.
- In general, the vehicles generated by a casino of the planned size at the existing St. Croix Meadows Greyhound Park will not have a significant impact to overall traffic operations in this area. It is anticipated that they key intersections and ramps reviewed in this study will operate at acceptable levels of service (LOS D or better), through the year 2020, if the casino development is built. This includes signalized intersections along Carmichael Road as well as the ramp operations on I-94 at Carmichael Road. Therefore, no traffic mitigation measures appear to be needed for the affected roadway system if the casino development is constructed.